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A NEW SPECIES OF *DONSIELLA* (COPEPODA: HARPACTICOIDA) ASSOCIATED WITH THE ISOPOD *LIMNORIA STEPHENSENI* MENZIES FROM MACQUARIE ISLAND

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Abstract

Hicks, G.R.F., 1990. A new species of *Donsiella* (Copepoda: Harpacticoida) associated with the isopod *Limnoria stephenseni* Menzies from Macquarie Island. *Memoirs of the Museum of Victoria* 50(2): 451–456.

A fifth species of *Donsiella* and the first from an algae-boring species of the genus *Limnoria* is described and illustrated. It differs from other donsiellines, inter alia, by the unique armature of the P1 endopod 2 claws. A key to the genus is presented and notes provided on aspects of the biology of this new species.

Introduction

The genus *Donsiella* Stephensen has recently been revised and its status, along with that of other new allied genera within the Donsiellinae, has been discussed in relation to the relocated position of the subfamily within the Thalestridae (Hicks, 1988a). Currently four species of *Donsiella* are known and all members of the subfamily are implicated either as direct associates of wood-boring species of the isopod genus *Limnoria* Leach, or of microhabitats occupied by them.

Some species of *Limnoria*, until now assigned to the genus *Phycolimnoria* Menzies (L.J. Cookson, pers. comm.), are active borers of marine algae, excavating tunnels particularly in the holdfasts and stipes of kelp (Laminariales and Durvillaealcs). Examination of material collected from Macquarie Island by Mr Harold Hamilton as part of Mawson's Australasian Antarctic Expedition 1911–1914 (see Hale, 1937), has revealed four donsiellines that were found as commensals of *Limnoria stephenseni* Menzies. Further specimens have subsequently come to light and since aspects of its morphology are unique, it is described here as new; this is the first species to be described from a seaweed-boring limnoriid. A key separating the five species of *Donsiella* has also been constructed.

Terminology, abbreviations, methods of study and type rationale were detailed in Hicks (1988b). Scale bars on illustrations are 0.03 mm.

Donsiella phycolimnoriae sp. nov.

Figures 1–3

Material examined. Syntypes: 60 females (5 dissected); 12 males (2 dissected) taken from sternum of *Limnoria stephenseni* in holdfasts of *Durvillaea antarctica* (Cham.) Hariot, Handspike Pt, Macquarie Island, 21 Dec 1977. MA-135, coll. D.S. Horning and J.K. Lowry. Deposited in Museum of Victoria, Melbourne, Australia (J14492). The host is registered as J16320.

Supplementary material. 2 females; 2 males on sternum of juvenile *Limnoria stephenseni* taken from burrows in kelp (*Macrocystis pyrifera* (L).C.Ag.) holdfasts, North end Macquarie Is., 3 Sep 1912. coll. H. Hamilton, South Australian Museum, Adelaide (C4201). 4 females (ovigerous) removed from sternum at base of legs of one *L. stephenseni*, Macquarie Is., stn C1-14, 19 Oct 1983 (no other data) (J14496). 3 brooding female *L. stephenseni* (same data as syntypes, J14493) were examined and the following were respectively removed from each marsupium: 6 females (3 ovigerous), 9 males, 28 copepodites, 34 nauplii; 9 females (4 ovigerous), 47 males, 61 copepodites, 164 nauplii (24 pairs in copula); 4 females (3 ovigerous), 9 males, 14 copepodites, 28 nauplii.

Description. Female. Total length 0.56–0.60mm. Body pyriform (Fig. 1a), broad (length/width ratio 1.8:1), moderately dorsoventrally flattened. Rostrum (Fig.1g), distinct with 4 long sensilla. Genital field (Fig. 1b), similar to other species in genus. Genital double somite with chitinous stripe; abdominal ornamentation as 2 short dorsolateral rows of fine spinules midway down double somite and short ventrolateral clusters posteriorly on this and succeeding two somites; posteromedial edges of somites naked except for sensilla. Caudal rami (Fig. 1c) divergent, tapering posteriorly, with cuticular pore proximolaterally and glandular (?) opening at outer distal corner; outermost apical seta short, basally scalciform, closely juxtaposed with principal seta; posteroventral margin of rami finely ciliate.

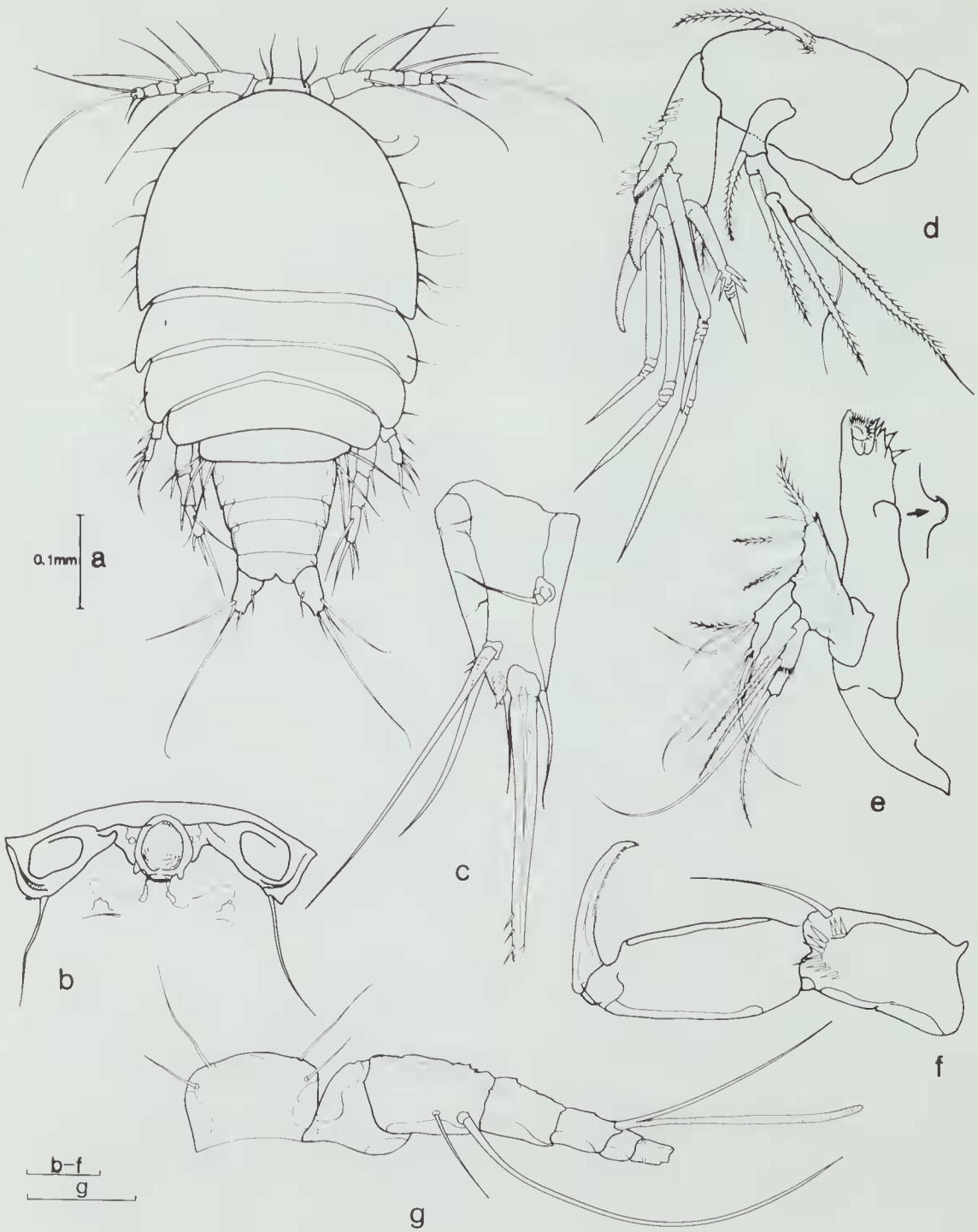

Figure 1. *Donsiella phycolimnoriae* sp. nov. Female. a, whole animal dorsal; b, genital field; c, caudal ramus; d, antenna; e, mandible; f, maxilliped; g, rostrum and antennule, most setae omitted.

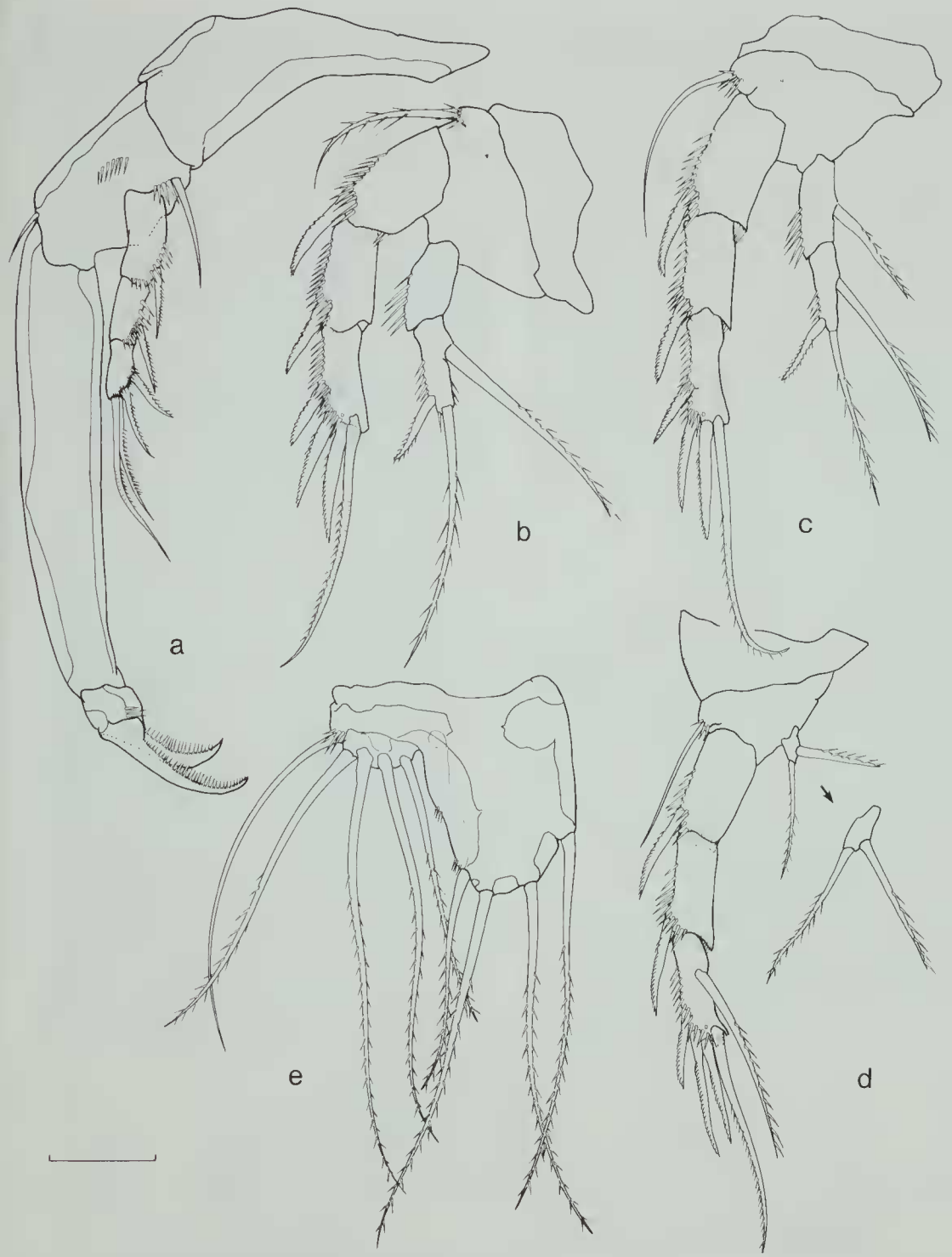

Figure 2. *Donsiella phycolimnoriae* sp. nov. Female. a, P1; b, P2; c, P3; d, P4 with endopod of larger specimen; e, P5.

Antennule (Fig. 1g) 6-segmented. Posterodorsal seta on distal part of second segment and apical seta of sixth segment particularly elongate; aesthetasc on fourth segment.

Antenna (Fig. 1d) allobasis stout. Coxa narrow. Endopod with 9 distal spines/setae, outermost geniculate with medial spinule cluster. Exopod second segment only slightly longer than first, setation of 1:22.

Mandible (Fig. 1e) cutting edge with large spines and a denticulate comb; pars molaris rounded. Coxa-basis with 4 setae, innermost arising at right angles to next outermost. Endopod one-, exopod two-segmented, suture weak on latter.

Maxillule and maxilla not significantly different from other species in the genus.

Maxilliped (Fig. 1f) prehensile. Palm stout, without setule; inner edge of claw finely serrate.

P1 (Fig. 2a) coxa narrow, elongate; basis with medial spinules; coxa-basis oriented longitudinally. First exopod segment longest, middle segment without inner seta, third segment with 4 distal spines/setae. Endopod without marginal setae; distal claws on second segment densely spinulose.

P2 (Fig. 2b), P3 (Fig. 2c), P4 (Fig. 2d) exopods 3-segmented with setal arrangement as in other species of *Donsiella*. Endopods of P2 and P3, two-segmented; setal formula of P2 is nominally 0:111, but a greatly reduced accessory seta (spine?) exists terminally; setal formula of P3 is 1:111; P4 bears two distal setae on the single reduced segment.

P5 (Fig. 2e) inner expansion of baseoendopod large with 4 elongate setae on posterior margin. Exopod reduced, distinct but with very weak suture and 4 elongate setae.

Male. Differs from female in following re-

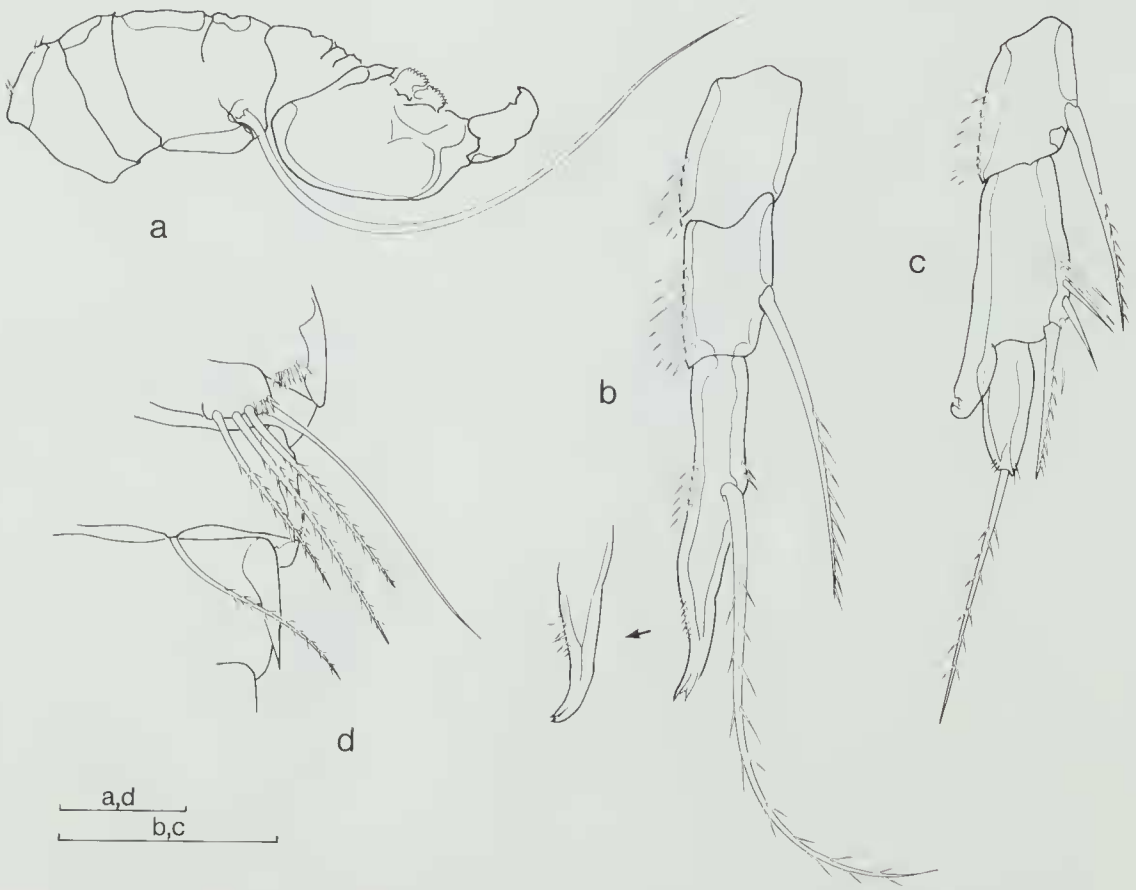

Figure 3. *Donsiella phycolimnoriae* sp. nov. Male. a, antennule, most setae omitted; b, P2 endopod with tip of another specimen; c, P3 endopod; d, P5 and P6.

speets. Body smaller (0.52-0.55 mm); first two abdominal somites distinct, each with 2 short dorsolateral spinule rows and posterolateral elusters on succeeding two somites.

Antennule (Fig. 3a) chirocerate, 6-segmented, ineomplete ineipient suture on article 3; fifth segment bears aesthetase and two thorny pads on anterior margin.

P2–P4 exopods armed and built as in female. P2 endopod (Fig. 3b) distally curved with bi- or trifurcate tip, depending on orientation. Medial segment of P3 endopod (Fig. 3e) with thumb-shaped outer distal process; third segment ellipsoid with seta arising terminally. P4 endopod as in female but a little smaller.

P5 (Fig. 3d) baseoendopod and exopod fused with 4 setae and some outer spinules.

P6 (Fig. 3d) a single elongate spinulose seta.

Variability. There are variations in the relative size of the P4 endopod in both sexes, conspicuousness of the baseoendopod/exopod suture in the female P5, degree of presentation of pars molaris, shape of CR and extent of lateral spinule patehes on abdomen of both sexes.

Remarks. Donsiella phycolimnoriae is clearly separable from other speeies in the genus by the unique spinule elaboration on the P1 endp. 2 elaws in both sexes (see Key). Moreover, in the female, the setation of the P2 and P3 endopods is quite unlike other species, yet there is an affinity with *D. bisetosa* in the P4 endopod and CR. In the male, the terminal origin of the P3 endp.3 seta is shared only with *D. anglica*, from which it differs in the overall proportions of this limb. In all other speeies this seta arises mediolaterally.

At about 0.5 mm in length, the body of *D. phycolimnoriae* is the largest within the genus, other species measuring in the region of 0.3 mm. Sueh a body size probably reflects the relative proportions of the host; at about 8.0 mm in length, *Limnoria stephenseni* is the largest known limnoriid (Menzies, 1957), other species measuring on average 3.0–5.0 mm. It might be instruetive in future studies on the phylogeny of the Limnoriidae to consider the coevolutionary consequences not only to body size, but also to appendage morphology of their donsielline commensals.

Biology. Laboratory experiments condueted on *Donsiella limnoriae* by Pinkster (1968), concluded that in the absenee of live speeimens of *Limnoria*, adult eopepods failed to survive more than 3 days. The suggestion was that the association between adult eopepods and the isopod host was obligatory.

Adult, ineluding ovigerous female, and juvenile donsiellines are frequently taken from the ventral surfaee of limnoriids, yet apart from Pinkster's observations, no naupliar stages have hitherto been eolleeted (Hicks, 1988a). Large numbers of nauplii along with older life eyele stages were removed from within the brood pouehes of three *Limnoria stephenseni* speeimens (see *Material*). Nauplii were distributed throughout the marsupium, closely applied to the surfaees of isopod embryos and prehatchlings. Moreover, one isopod contained a substantial number of adult males that were in preeopulatory assoeiation with female eopepodites, again the first time this behaviour has been reeorded in donsiellines. The intriguing question is whether or not aspects of the reproductive repertoire (preeopulatory clasping, copulation, egg laying, eclosion of nauplii), are aetually timed to oecur within the safety of the host marsupium. Should this be so then nauplii would be in an ideal situation to infect the young isopod manca stages as they emerge from the maternal brood poueh. Alternatively, Pinkster (1968) found that nauplii lived twiee as long as adults in the absenee of the host and eoneluded that they were free swimming and free living, implying that this might be the invasion pathway. By whatever proeess this commensal/host relationship is maintained, it is elearly a matter in need of fresh investigation.

Key to speeies of *Donsiella* (both sexes)

1.	P1 endopod 2 claws naked 2
—	P1 endopod 2 claws strongly spinulose ..... *D. phycolimnoriae*
2.	CR only slightly longer than wide; P5 baseoendopod with 4 setae in female 3
—	CR much longer than wide; P5 baseoendopod with 3 setae in female ..... *D. bisetosa*
3.	P2 and P3 endopod 2 with 2 and 2 setae respectively in female; P3 endopod 1 with seta in male 4
—	P2 and P3 endopod 2 with 4 and 3 setae respectively in female; P3 endopod 1 without seta in male ..... *D. limnoriae*

4. P4 endopod of both sexes with 1 long seta; P2 endopod 3 of male terminally digitiform ..... *D. anglica*
— P4 endopod with 1 long seta in female, 2 in male; P2 endopod 3 of male terminally bifurcate ..... *D. victoriae*

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